



Dictionary Based Segmentation in Volumes

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DICTIONARY BASED SEGMENTATION IN VOLUMES



Emerson M. J., Jespersen K. M., Jørgensen P. S., Larsen R. & Dahl A. B.

INTRODUCTION

Method for supervised segmentation of volumetric data. The method is trained from manual annotations, and these annotations make the method very flexible, which we demonstrate in our experiments. Our method infers label information locally by matching the pattern in a neighborhood around a voxel to a dictionary, and hereby accounts for the volume texture.

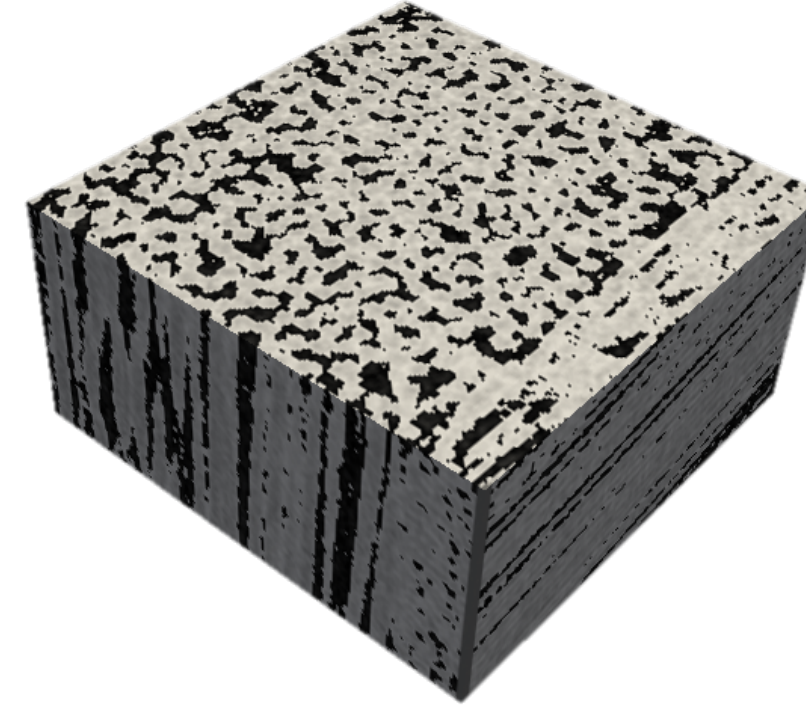
DATA

Two different data sets to demonstrate the flexibility of the method.

1. Glass fiber

GOAL

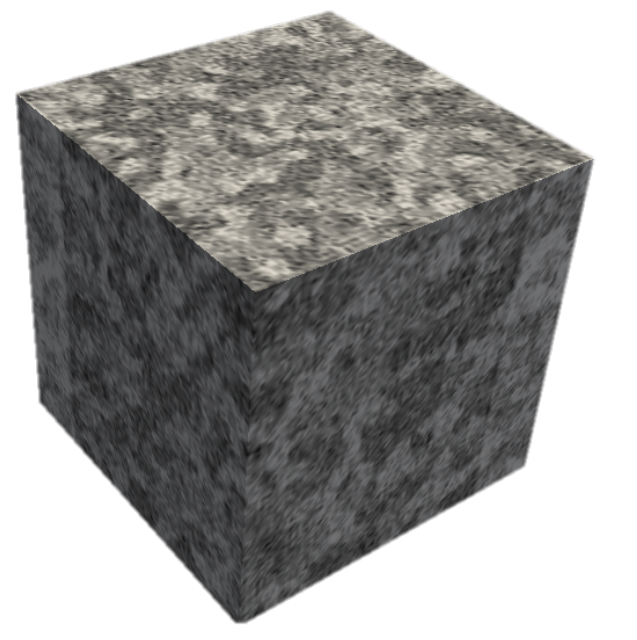
Extract centers
and
determine diameters



2. Solid Oxide Fuel Cell Phantom

GOAL

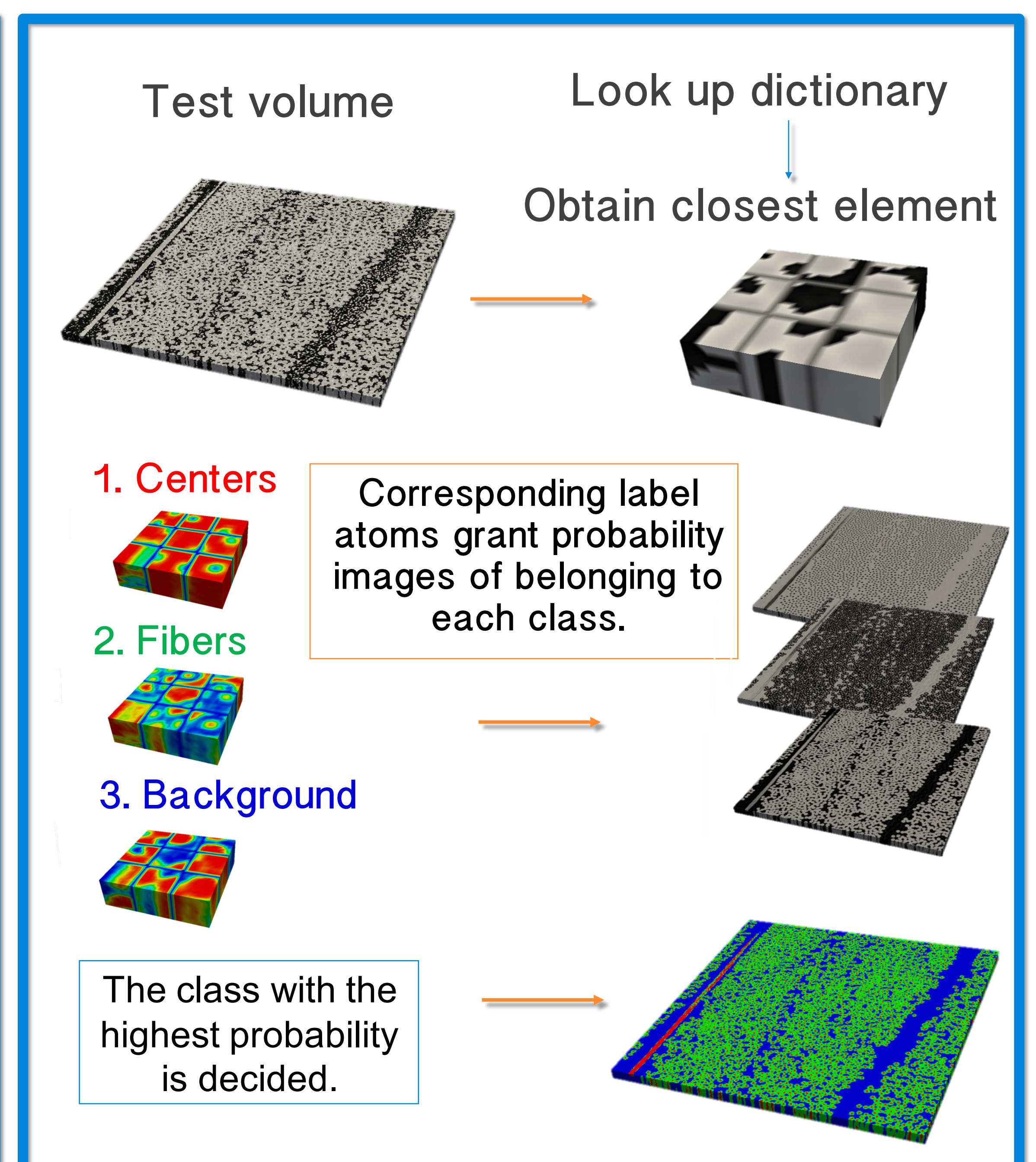
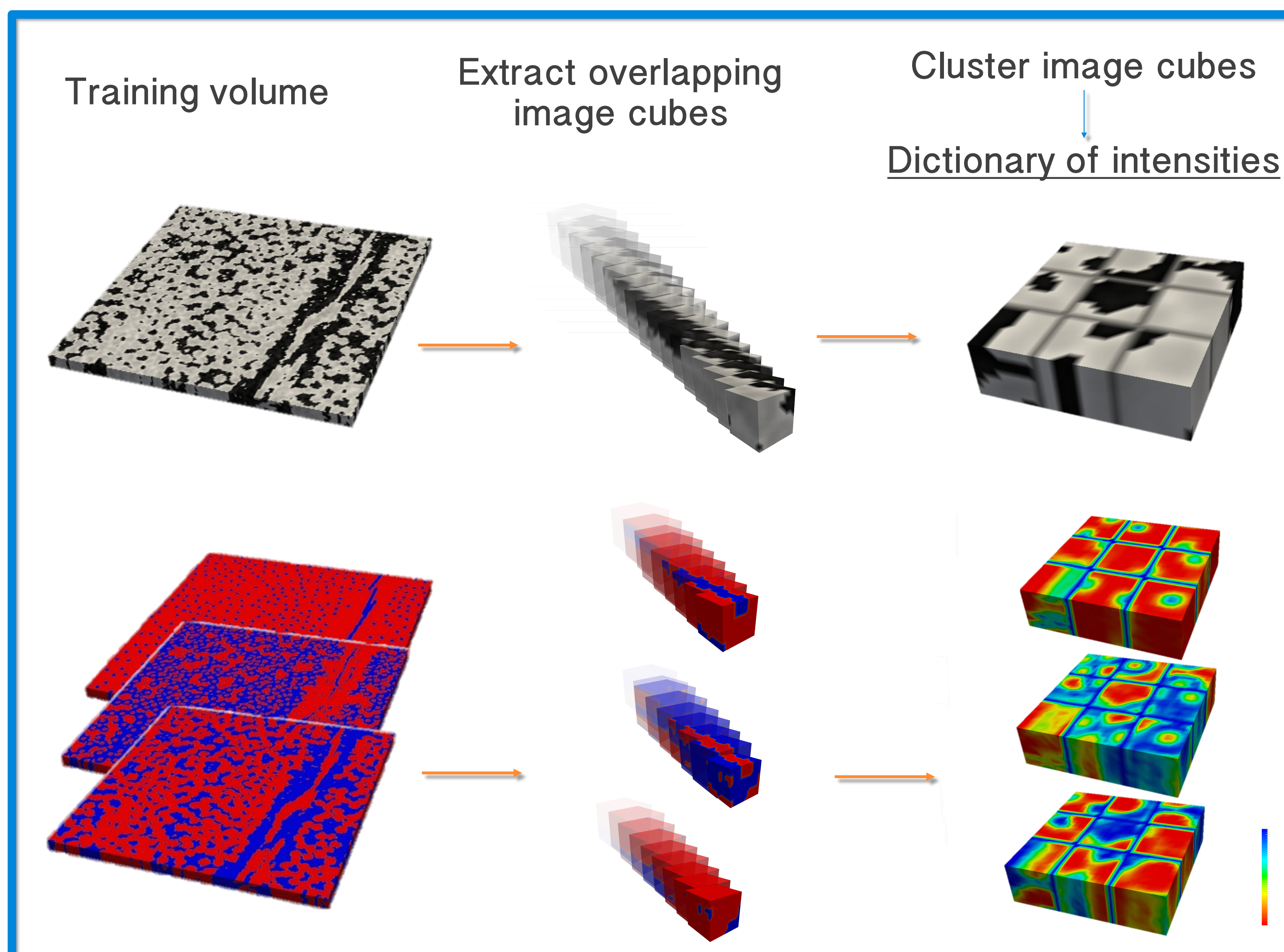
Extract the three
phases



METHOD

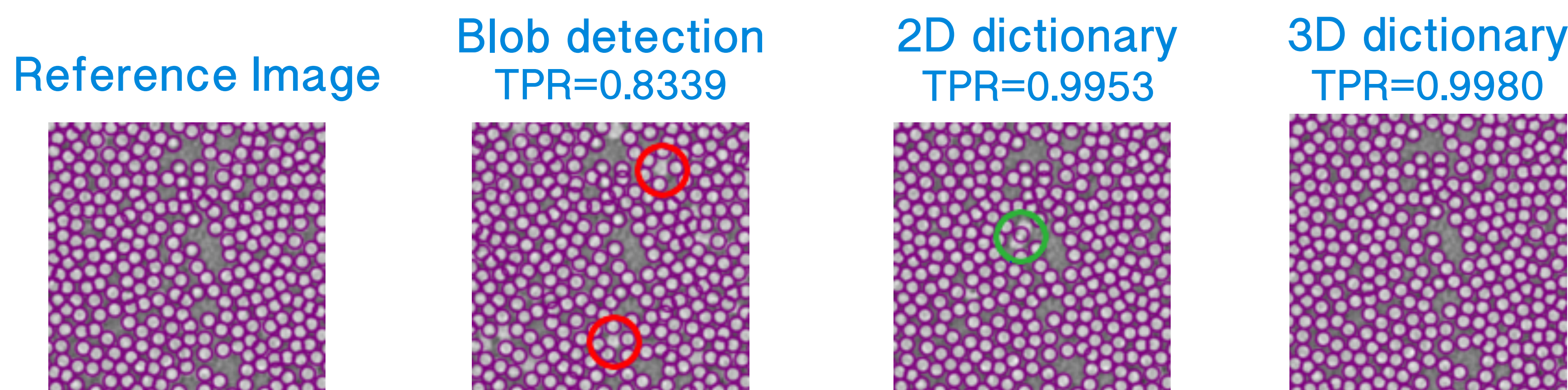
1. Training

2. Classification

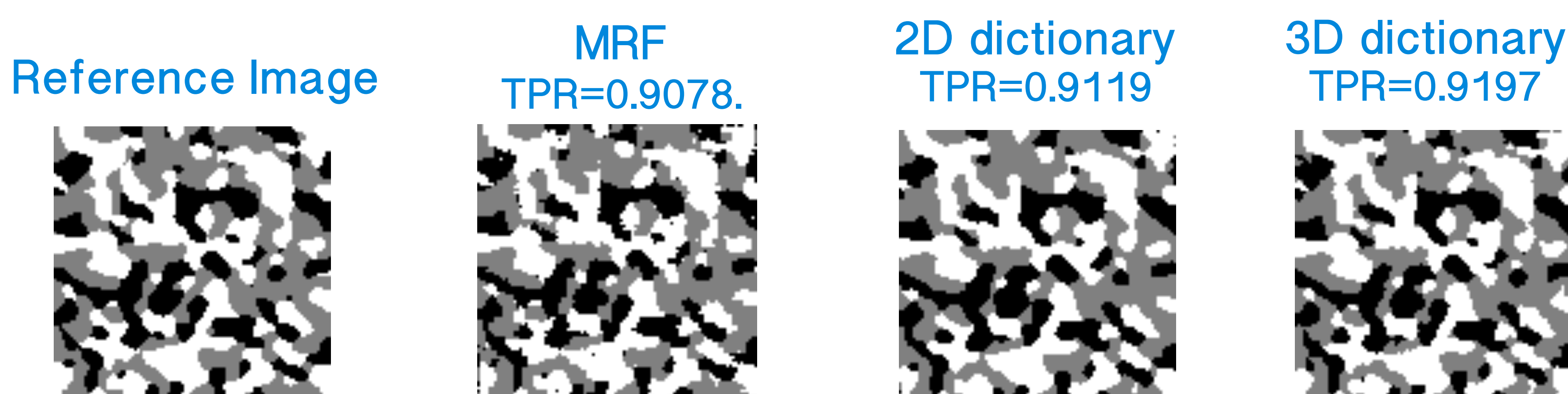


RESULTS

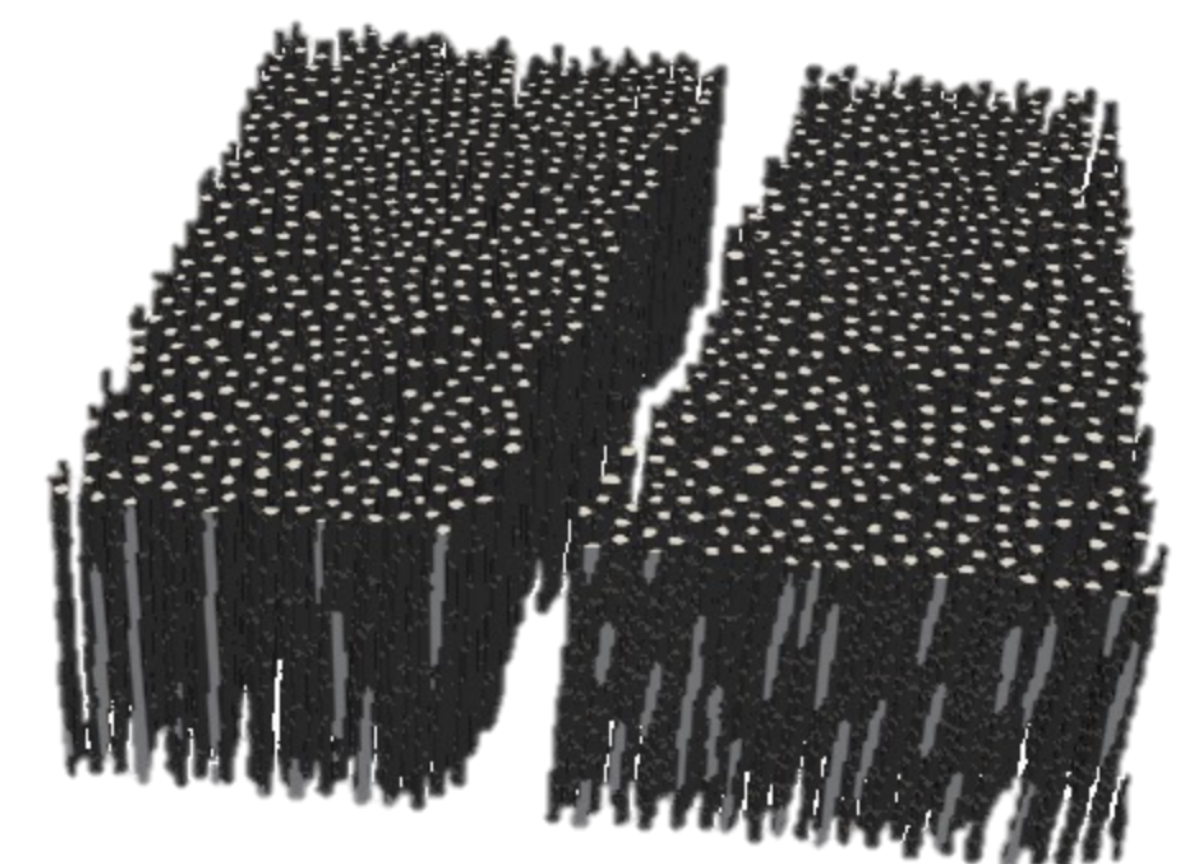
Fiber center detection results are compared to a well established image analysis method, 2D scale space blob detection [2]. Circles are plotted around the center coordinates.



SOFC three phase classification results are compared to a well established image analysis method, Markov Random Fields (MRF) [3, 4].



Segmentation over a stack of 100 slices



CONCLUSIONS

- Highly flexible and accurate method for 3D segmentation of complex image structures.
- Improved performance by extending to 3D, at the expense of longer computation times.
- Close to perfect segmentation of individual glass fibers in wind turbine blades.

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